

Thursday, July 24, 2014

There's really not much to the "design". It was all ad hoc. When I decided to do it that way, I got lucky.

The upper level is about 42" higher than the lower. When we poured the upper slab, we embedded a 3"x3" angle iron, with 12"-18" rebars welded to the inside of the angle, in the concrete. I wanted to be sure the concrete wasn't damaged by the concentrated load on the ramps.

Since the 14" I-beam I got for "nearly free" to use for the ramps was about 15' long, I had the posts positioned 7' from the 42" drop to the lower level. The distance between them was set to match the GMC's front tread since I figured that would be the heaviest load it would ever see. Not knowing whether the idea would work and whether I'd want to leave it in place, I had "sockets" set for the posts: 5" tubing 18" long with angle irons welded across the bottom. Those were set in 18" footings as the lower slab was poured.

For the posts, the closest I could get to the ID of the 5" tubing was about 4-1/2" OD, so I turned spacers from PVC pipe to mate the two. They fit together so tightly it would take a jack arrangement of some sort to get them posts out. At least, with the PVC between them, they shouldn't rust together. The cross beam between, and beyond, the posts was fitted with sockets of the same 5" tubing so that the 3"x3" cross beam just sets on the posts, with a single 1/2" through-bolt to secure it (for no good reason). The beam extended beyond the posts far enough for the ramps to support the ramps when positioned for the rear of the GMC. Since the beam extended from post to post, any narrower tread vehicle could be accommodated also.

The 15' I-beam was cut into 7-1/2' sections. The lower flange was notched at the upper level end so that the web rests on the angle iron embedded in the upper slab. The tops of the flanges were rounded and smoothed to be gentle on tires that may touch them. The end at the posts rests on the angle iron's horizontal flange. 8" high stops were welded between the flanges so I don't drive too far. Tabs on the ramp are fitted over the vertical flange to eliminate any possibility of the ramp disengaging from the angle iron -- another unnecessary precaution, as it turns out.

Everything's unbelievably sturdy. Before putting any weight on the ramps I tried to calculate the load deflection to determine whether intermediate supports might be required. The best I could figure, the maximum deflection, with the GMC's front wheels in the center of the ramps, should be 0.060". The dial indicator I fitted for the test showed 0.038" -- and there was probably some sand crushing in that.

After using the ramp for a short time, I was thoroughly disgusted with the design: That beam between the posts HAD to go: Too much ducking & head knocking. So I cut between the posts in a location that allowed me to swap sides with the cut pieces and rotate them 180*. That gave me just enough support space between the posts for my S-10 (my narrowest tread vehicle). It also provided

support on the outsides of the posts for removable 2x12 walk planks -- especially needed since the 23 GMC's door opens over "open air".

Under the now-unsupported outer ends of the beam(s), I welded 3" posts with 3"x6" plates on their bottoms. With Liquid Nails (or similar) beneath the feet and lag bolts into the concrete slab, they haven't moved a-tall.

And since most of the weight of any vehicle on the ramps is borne by the 4" posts, they're far stronger than necessary.

One serious mistake was filling the post sockets with used motor oil to inhibit rust. The first time it got wet around the posts, the oil started floating out. I finally had to pump some out and seal around the posts with silicone. That's nearly, but not completely, solved the problem. At least the oil floating on the now-trapped water should still inhibit rusting. But the concrete around the posts is pretty badly stained. I'm not sure how the epoxy finish I expect to eventually apply will adhere, regardless of how I try to clean it.

What would I change? Not much. I MIGHT make it a bit higher because my Honda touches my head if the HF roll-around stool is set too high. On the other hand, when I need to reach 'way up, the stool might not reach high enough and I'd have to stand with knees bent -- not a good position at 77 yo. The tabs on the beam end of the ramps might go -- sliding the ramps to new positions is impossible if they even slightly cocked because the tabs lock that end -- probably a good thing, really.

I don't have any safety barrier on the upper level (on ANY side). I'll soon be installing cables down the long side of the upper level. I should have installed sockets across the short, ramp, side so I could install barrier support posts when the ramp is empty. Surprisingly the building inspector said nothing about that safety hazard. At least this design doesn't require 4-side protection, or a cover, to be safe, like a normal pit.

If you do build something similar, don't fail to leave sufficient work space on each side -- having standing room there is one of the greatest benefits of the design. Also, plan ahead for up-and-down. I have fixed stairs on one side, but none on the other -- and no room for them fixed, so I take a lot of extra steps. You will need something similar to my roll-around service stand (weight on it overcomes the caster springs so it sets down on fixed feet) to get to the front of the coach. Mine is taller than the bottom of the front hoods and has a shelf on top which is very convenient. But because of the extra steps problem, I'm thinking of cutting it down to the height of the upper level so I can use it for "other side stairs".

One of the best add-ons is the mirror mounted on the wall ahead of the left ramp. With the positions for the ramps marked on the upper level angle iron for each vehicle type, the mirror lets me see the left front wheel so I can just drive on, without getting out multiple times to check alignment.

HTH,
Ken H.